

Brief Description of 12002

Rock 12002 is a medium-grained, porphyritic basalt containing phenocrysts, of colorless olivine and red-brown clinopyroxene in a variolitic matrix of intergrown plagioclase and clinopyroxene (fig. 17). In the matrix, the intergrown plagioclase and pyroxene form bundles radiating from a common nucleus. Rock 12002 is a low-Ti basalt from the Apollo 12 site that has been studied by Grove *et al.* 1973. Modal and chemical analyses of this sample are presented in table IV.

Olivine - Colorless, anhedral phenocrysts of olivine Fo_{76-61} have abundant devitrified melt inclusions (fig. 19). Some sections contain large olivines with relict skeletal form surrounding crystallized groundmass.



Figure 17 – Texture of mare basalt 12002. Rounded and speckled phenocrysts of olivine and large elongate phenocryst of clinopyroxene. Groundmass contains intergrown plagioclase, pyroxene and ilmenite.

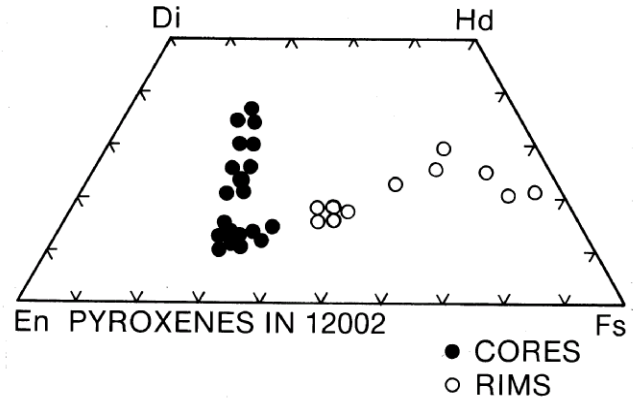


Figure 18 - Compositions of pyroxenes in 12002 as represented on En-Fs-Di-Hd quadrilateral. The Mg-rich cores zone to become Fe-rich rims. Chemical zoning is also different in different crystallographic orientations.

Pyroxene - Large clinopyroxene phenocrysts grew as laths containing hollow sectors which are now filled with groundmass minerals. The red-brown pyroxenes become intensely colored toward their rims, and they have complex chemical zoning growing from pigeonite cores to subcalcic-augite in one sector while growing to ferropigeonite in the other sector (fig. 18). Subcalcic, augite rims and groundmass pyroxene are very Fe rich and are intergrown with plagioclase and ilmenite.

Plagioclase - Anorthite plagioclase An_{95-89} is intergrown with clinopyroxene in variolitic fashion. Some lath-shaped plagioclase crystals are hollow with intrafasciculate texture (fig. 20).

Opakes - Laths of light-gray ilmenite are found in the groundmass and within the Fe-rich rims of the pyroxene. Blocky glomerophytic clusters of dark, gray chromite are common. Brown ulvöspinel overgrowths or reaction rims occur on many chromites (fig. 21). However, euhedral chromite inclusions within olivine phenocrysts lack the ulvöspinel rims. Blebs of native Fe are often associated with chromite-ulvöspinel grains. Blebs of immiscible troilite and metallic Fe are found in the matrix.



Figure 19 – Large melt inclusion trapped in olivine in 12002. The melt inclusion has crystallized to ilmenite and an intergrowth of plagioclase and pyroxene. Melt inclusions form in olivine because olivine grows as skeletal crystals that surround some of the melt during the crystallization.



Figure 20 - Intrafasciculate texture of plagioclase laths in 12002. Bundles of hollow plagioclase crystals are intergrown with pyroxene, ilmenite, and mesostasis.

Mesostasis - Interstitial areas contain brown glass and trace silica. Spongy pyroxferroite is found in some sections (fig. 22).

Petrogenesis - Chromite inclusions in olivine and pyroxene phenocrysts indicate that chromite was an early phase. The texture and skeletal nature of minerals in this rock indicate that it was cooled rapidly and might represent a primitive lunar liquid. This composition has been experimentally studied (Grove *et al.* 1973) to discern the depth of origin at 300 km with a source of olivine plus clinopyroxene.

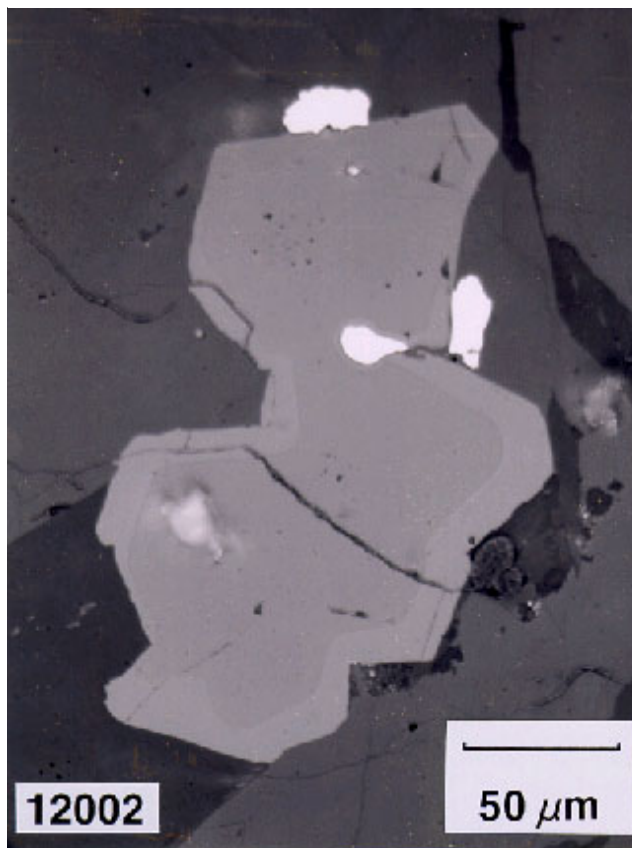


Figure 21 - Glomerophyric chromite grains are overgrown with ulvöspinel rims in 12002. They are associated with troilite and metallic Fe grains. Chromite inclusions in olivine are not overgrown. This is a reflected light photo.

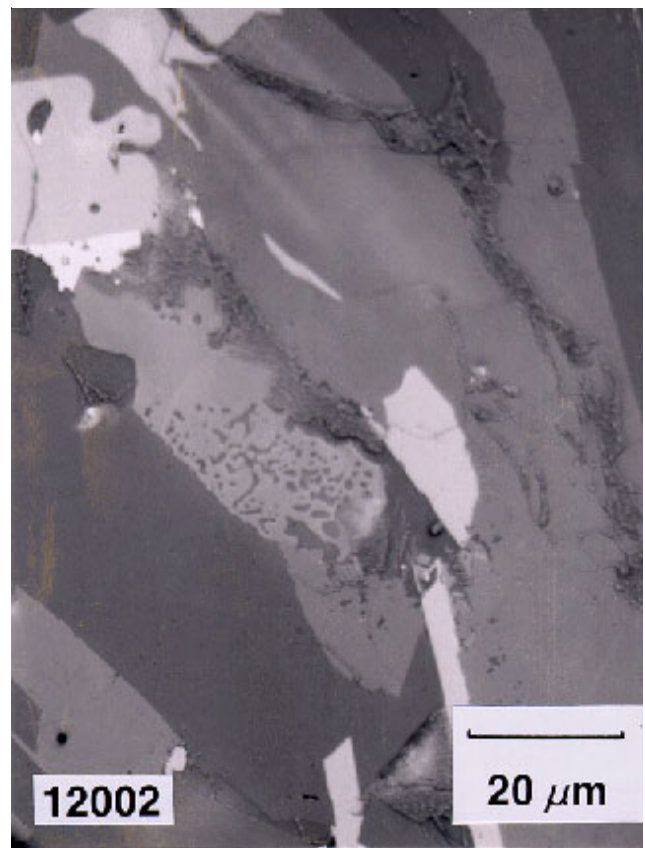


Figure 22 - Spongy pyroxferroite is found adjacent to brown glass in mesostasis of 12002. This is a reflected light photo.